

Establishing Virtual Enterprises in Science and Technology Parks - The Analysis of Trends in Czech Science and Technology Parks

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Executive Summary

The purpose of the contribution is to present the virtual enterprise and its positive influence on the company's competitiveness.

The first part of the contribution is focused on the virtual enterprise. The virtual enterprise is new and dynamic way for enhancing the competitiveness of the company. However small and medium enterprises are limited by their resources and capabilities to effectively implement modern types of corporate structure such as virtual enterprise. Therefore science and technology parks should be prepared to provide a sufficient support in enhancing tenant's competitiveness. However the support should be focused only on particular part of the virtual enterprise lifecycle - dynamic phase. Dynamic phase is consisted of partner identification and enterprise configuration.

The second part of the contribution is focused on the survey amongst science and technology park tenants. The results are that tenants already have experience with similar cooperation to the virtual enterprise and therefore the implementation would not be that hostile. Secondly, the tenants would welcome a support from the science and technology parks in terms of virtual enterprise implementation.

1. Introduction

The current global market is dealing with challenging competitive environment. For small and medium enterprises it is difficult to reach a business opportunity. When the company is hoping for the success it must keep competitive advantage against the competitors. The recent trend shows the tendency of streamlining. The companies are trying to focus on their core competencies. But in many cases a new business opportunity requires a capability which company does not have access to. Therefore this new business opportunity can be achieved by creation of virtual enterprise where the opportunity is reached through integration of each member's core competence. Therefore, this is the reason why the modern types of structures such as virtual enterprise emerge. The other reasons of existence of virtual enterprises are to reduce expenses, increase capacity, broaden markets and improve knowledge.

One of the main characteristic attribute of small and medium enterprises is its flexibility. Hence small and medium enterprises are suitable for establishing emerging high-flexible types of organizations such as virtual enterprise.

2.1 Virtual Enterprises

There are many definitions of virtual enterprise. For example Byrne (1993) defines virtual enterprise as "a temporary network of independent companies, suppliers, customers - even rivals, linked by information technology to share costs, skills and access one another's markets. It will have neither central office nor organisational chart".

Fuerhrer (1997) defines virtual enterprise as "a temporary network of independent institutions, businesses or specialised individuals, who work together in a spontaneous fashion by way of information and communication technology, in order to gain an extant competitive edge. They integrate vertically, unify their core-competencies and function as one organisation".

According to Putnik & Cunha (2005) the definition, the virtual enterprise (VE) is defined as "enterprises with integration and reconfiguration capability in useful time, integrated from independent enterprises, primitive or complex, with the aim of taking the profit from a specific

market opportunity. After the conclusion of that opportunity the VE dissolves, and a new VE is integrated, or it reconfigures itself in order to achieve the necessary competitiveness to respond another market opportunity” (Putnik & Cunha, 2005).

According to Salamon and Sir (2005) there are 4 main characteristics of VE

- 1) Core competencies
- 2) Flexibility
- 3) Trust
- 4) Excellence

Core competencies are knowledge, experience, skills, technology, data, know-how, contacts and sources which every member of VE brings to the cooperation. By combination of these competencies, the VE (and its members) reaches a new level of competitiveness.

The other characteristic is flexibility. VE should be the synonym for flexibility. VE has to adapt to the new market transformation and flexibly react to it. However the reaction is not enough in the modern economy. VE should use the extended access to the member’s knowledge to predict the market so it is prepare for the change before it occurs.

The trust is the essential part of the VE. Without sufficient trust between members, VE cannot be established. The members share between each other their knowledge, skills, know-how etc. Therefore without trust the VE won’t function ideally. On the other hand blind faith between members is neither recommended.

The reason why VEs are established is excellence created by combination of members’ core competencies. VEs are effective type of organization which provides high quality and reduction of costs.

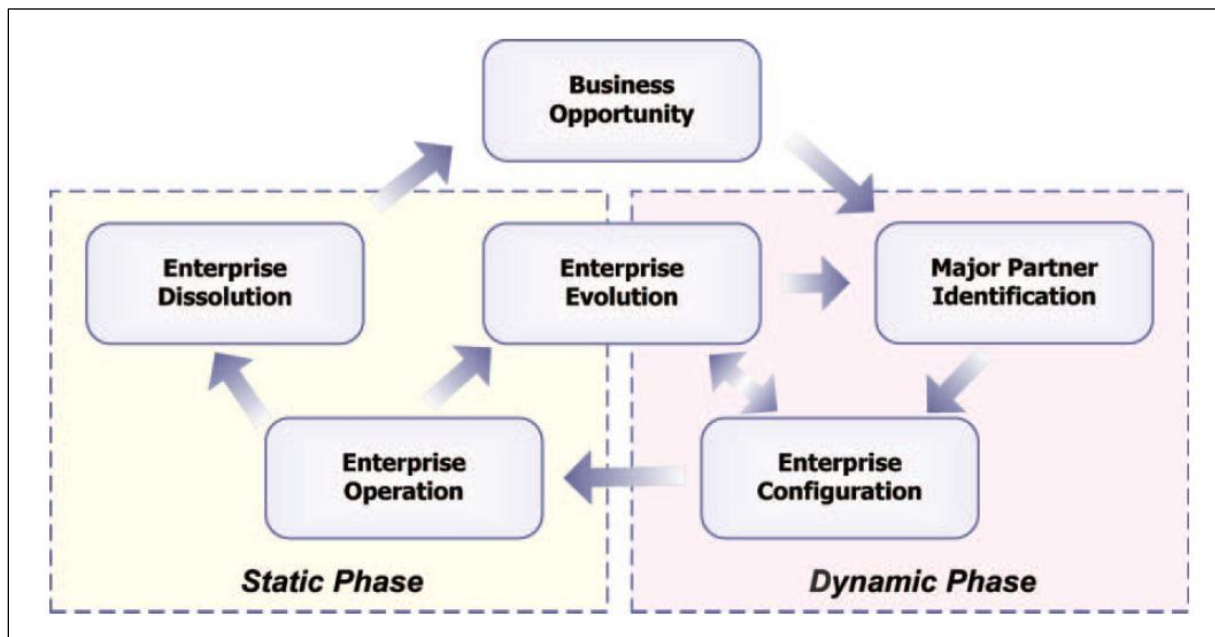
There are several challenges which companies have to face in establishing the virtual enterprise. The major challenges are according to Kim et al (2007) effective synchronization and integration of business components. Especially according to Wadhwa et al. (2009) the main role of integration of business components is made by ICT. Crispim and Sousa (2008) add the selection of suitable partner as another major challenge.

The virtual enterprises are going through the lifecycle. Figure 1 shows the lifecycle of virtual enterprises. The life-cycle is divided into six parts:

- 1) *Business opportunity*: A new business opportunity is identified through market analysis.
- 2) *Major partner identification*: At this stage, the major partner is trying to be found. There are several candidate enterprises (CE) in consideration.
- 3) *Enterprise configuration*: At this stage, candidate enterprise become member enterprise (ME) and VE architecture is defined including information, resources and communication to allow integration of the diverse business components.
- 4) *Enterprise operation*: At this stage, the VE is operated through collaborative business processes. VE should monitor current market and business processes continuously.
- 5) *Enterprise evolution*: At this stage, the VE is face with major business change and it has to adapt new configuration.
- 6) *Enterprise dissolution*: As business opportunity disappears the VE is dissolved.

Source: Kim et al (2007)

Figure 1: Lifecycle of virtual enterprise



Source: Kim et al (2007)

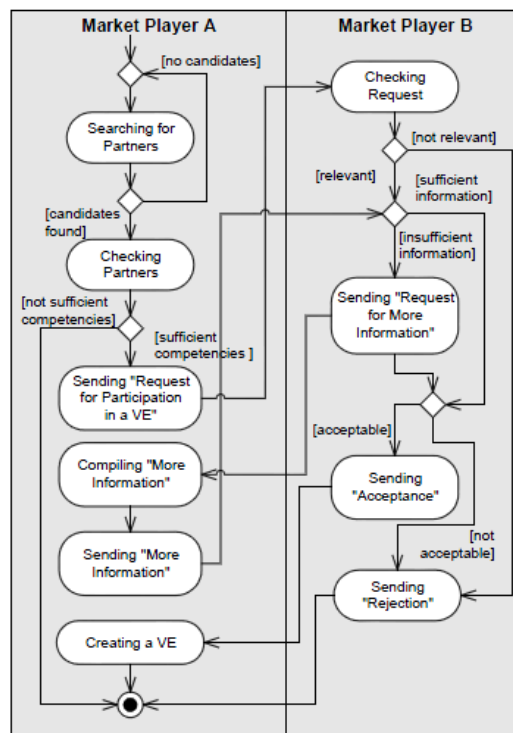
Crispim & Sousa (2008) focus on the issue of partner identification. Partner selection is multi-criteria decision making problem which is based on incomplete or non-available information. According to their research there have been outlined the main challenges in partner identification. Namely these are

- 1) A concern about selecting the right partner. The selection of suitable partner is crucial for the VE formation.
- 2) A need to obtain complete and diversified information about each potential partner.
- 3) Subjectivity of data. The evaluation of the results can be influenced by manager's subjectivity.
- 4) A concern about time depended issues. The conditions of the business opportunity may change during the partner selection process. Therefore the
- 5) A need for simplification of the results.

Source: Crispim & Sousa (2008)

Do et al. (2000) published the article where they deal with process of partner identification. Figure 2 display the process of formation of VE. This process starts with the market opportunity which is identified by Market Player A (MPA). However MPA's competencies are not sufficient to address the market opportunity. Therefore there is a need for partner search. By using the profile database, the partner with suitable competencies is contacted. The request is checked by Market Player B (MPB). After the exchange of information the MPB has to decide if the VE will be created or not.

Figure 2 Example process type “VEFormation” (UML Activity Diagram)



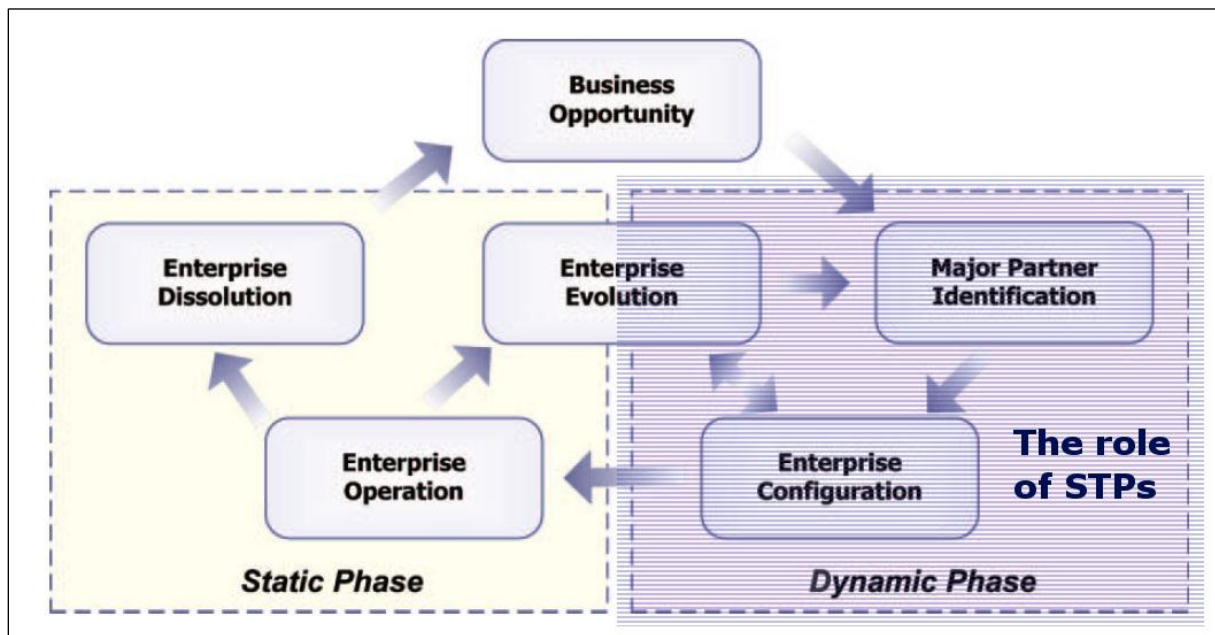
Source: Do et al. (2000)

2.2 Using the VE in Science and Technology Parks

According to the life-cycle of virtual enterprises the role of science and technology park (STP) is in establishing (managing) dynamic phase - as it is drawn on Figure 3. The science and technology parks as a platform for the SME's support are capable of giving the right direction for their tenants. Science parks may possess the information, facilities, skills and contacts which start-ups and SMEs cannot easily get. Therefore when there are challenges of establishing virtual enterprises, science parks can play a major role in the process.

On the other hand the virtual enterprise operation should be mainly operated without the influence of science and technology parks. The same rule applies for enterprise dissolution. The enterprise evolution (which occurs in the case of change of market conditions) can be solved in both ways - with and without the participation of science and technology parks.

Figure 3: The role of STP in life-cycle of virtual enterprise

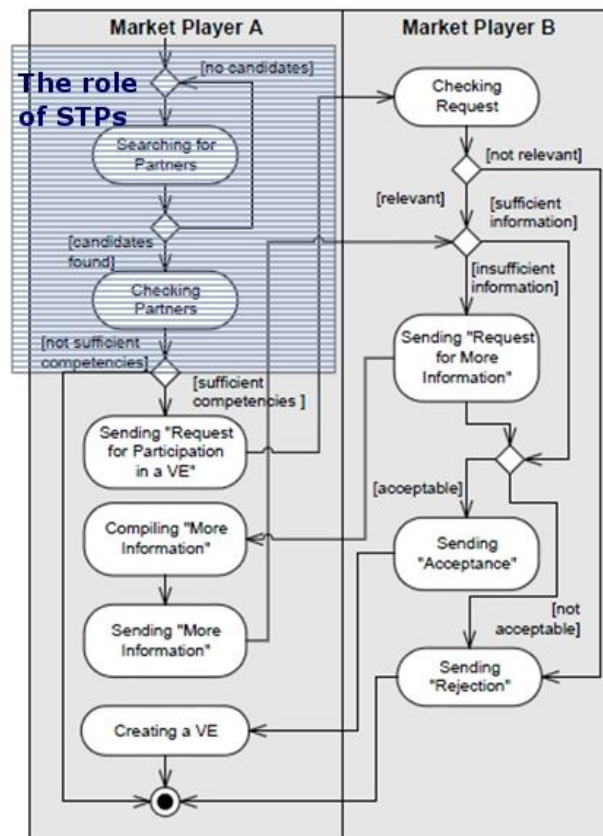


According to the main concerns in partner identification, STPs are able to secure some of the most important parts such as providing complete and diversified information about potential partners and reducing the subjectivity of the results. The small and medium enterprises are limited with contacts, especially when the contacts are into the foreign country. The costs for establishing the partnership is higher the more exotic partner it is. The cultural and language barriers can be for many small and medium enterprises insurmountable. Science parks have the ability to enable enterprises to contact each other and give them appropriate support. Therefore the tenants are less concerned about selecting the right partner.

The Figure 4 shows the role of STPs in the VE Formation process especially the role in finding the right partner. At the process scheme it is possible to see that the role of the STP is in the early stage of VE formation. Therefore there is the place where STPs should aim their support.

On the other hand the exchange of the information between potential partners should remain only between them. They should decide by themselves whether the partner is acceptable or not. The next possible opportunity for science and technology parks arises in actual VE creation. STPs should provide to the new VE members framework of VE creation so the formation of VE would be accomplished without major difficulties.

Figure 4: The role of STPs in VE formation process



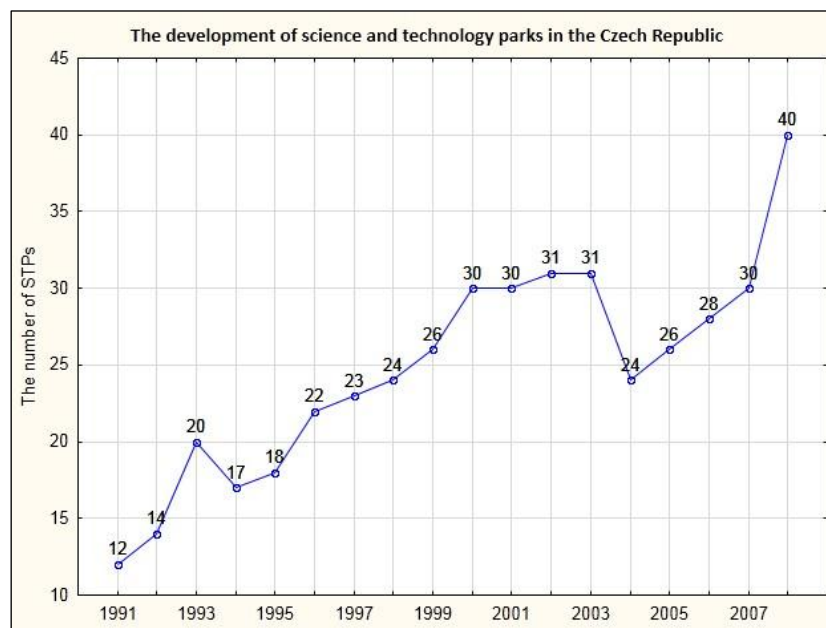
Finally there is a crucial need for synchronization and effective communication. The costs for establishing comprehensive IT environment are mainly very expensive. Science parks often already have sufficient IT equipment or the costs can be spread between tenants.

2.2 The Situation of Science and Technology Parks in the Czech Republic

The Czech Republic (and other post-communist countries) is specific in lack of long-time experience and tradition with entrepreneurship and its support. Currently in the Czech Republic there are almost 41 certified science parks. From this number only 6 are members of European Business and Innovation Centre Network.

Figure 5 shows the development of science and technology parks in the Czech Republic during the last twenty years. It is evident that there is long-term stable growth. The downswing in 2004 is caused by the change in STP certification criteria. The institution which certificates STPs is called Science and Technology Parks Association CR (www.svtp.cz).

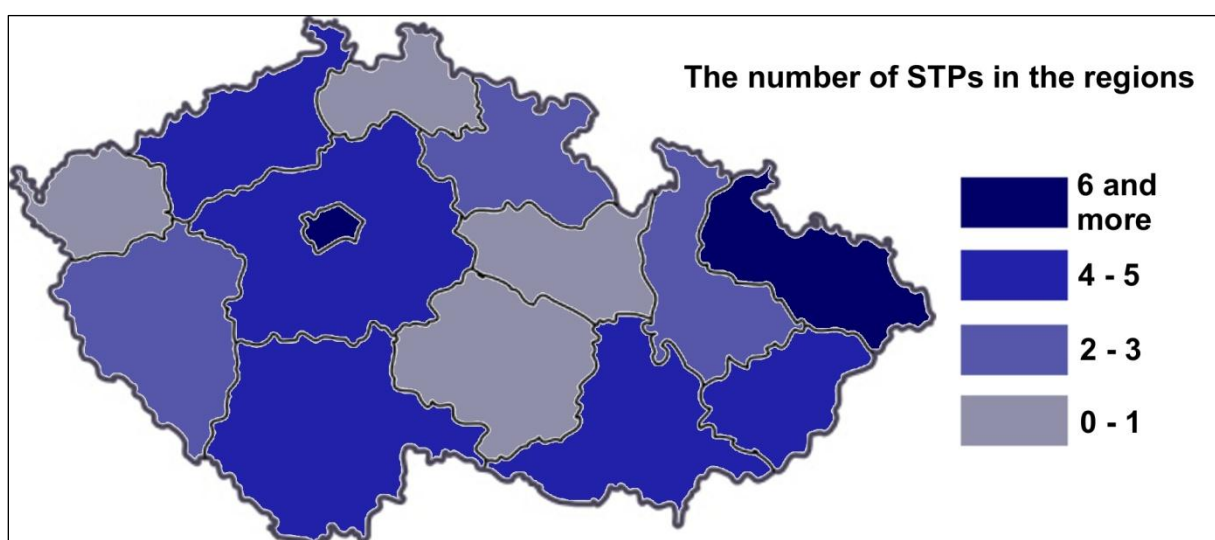
Figure 5: The development of science and technology parks in the Czech Republic



Source: Svejda (2006)

The other view on the situation is from the current number of STPs in different regions. Figure 6 reveals the noticeable differences between the regions. Especially Liberecky, Pardubicky, Karlovarsky and Vysocina regions have dismal number of STPs. On the other hand Prague and Moravskoslezsky region have the highest number of STPs in the Czech Republic. The actual number of science and technology parks may vary from the map, because some of STPs are not interested in official STP certification. To partially avoid the inaccuracy, the other database called “Technology profile of Czech Republic” was used. Most of the STPs are duplicate but some new STPs were added to the list.

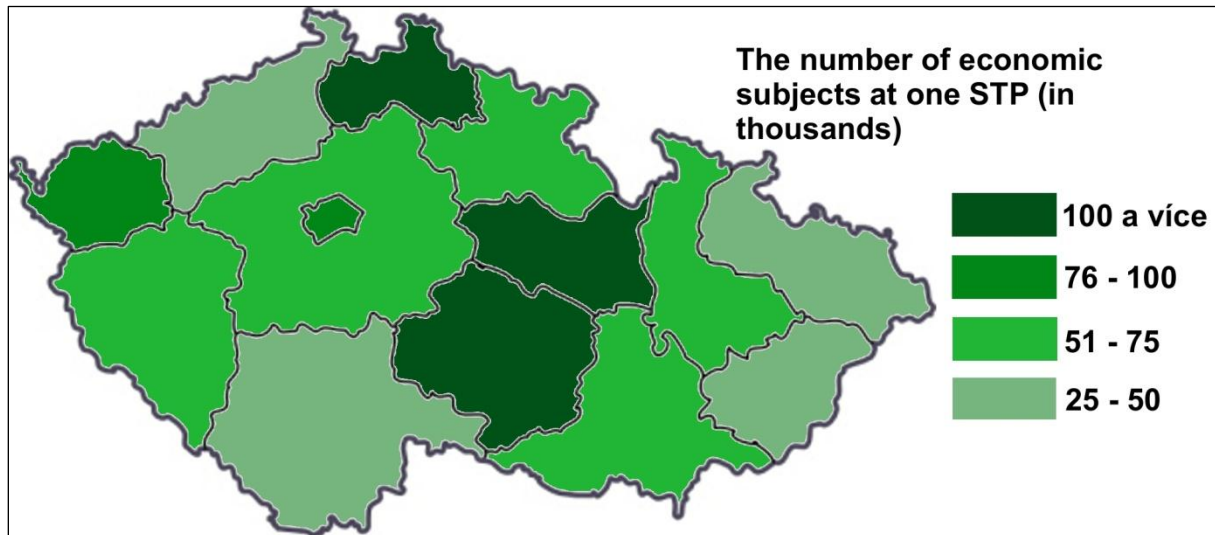
Figure 6: The number of STPs in the regions



However according to the high economical and demographical differences between regions, the absolute number of science and technology parks is not representative enough. Figure 7 shows the number economical subjects at one science and technology park. Some regions remained subnormal but some can be seen in the new view. The main difference is that region Prague is not the leading player amongst regions. The number of economic subjects is on average level. On the other hand

the bottom of the chart regions mostly remains on their positions. The very strong region in terms of science and technology parks is Moravskoslezsky region. The most probable explanation is that Moravskoslezsky region is a region with high unemployment in long-term view. Hence, the government and EU financial support is aimed there for region economic growth stimulation. The same explanation applies for Ústecký region which suffers from the same issues. The highest potential region appears to be Pardubický region. It is the region with high economic productivity but with only one science and technology park.

Figure 7: The number of economic subjects at one STP in the regions



2.3 The Situation of Virtual Enterprises in the Science and Technology Parks

The survey about the virtual enterprises was made amongst twenty-one tenants across the STPs in the Czech Republic. The questions were designed to get the information about the experience with virtual enterprises and the expected approach from STPs.

Figure 8 shows the experience with cooperation similar to virtual enterprise (the explanation of the term was part of the questionnaire). 70% respondents answered that they already have an experience with cooperation similar to virtual enterprise.

Figure 8: The experience with virtual enterprise

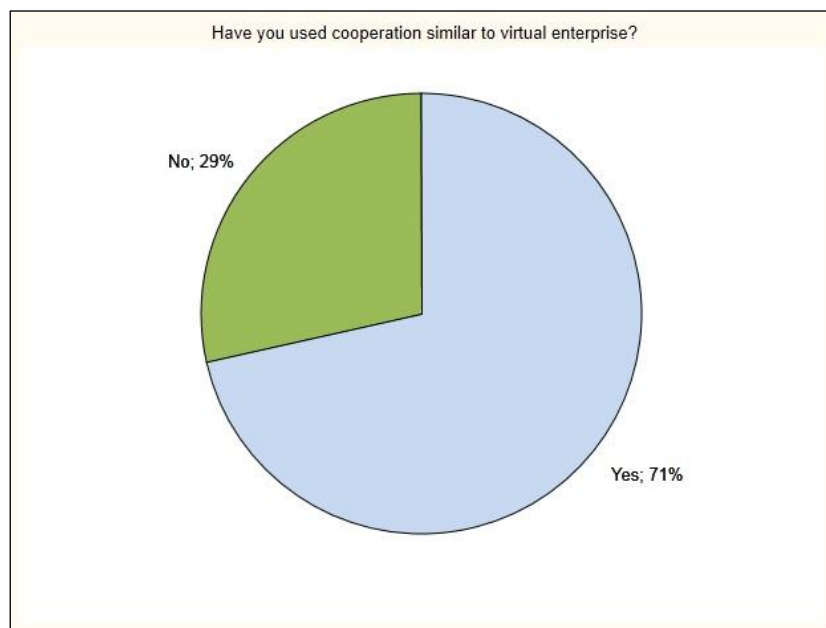


Figure 9 shows the situation within the STPs. The respondents were asked whether they know if there is any sort of support of virtual enterprises in their STPs. In this case 48% answered yes. 48% answered I don't know and 5% answered that no.

Figure 9: The current support of VE in STPs

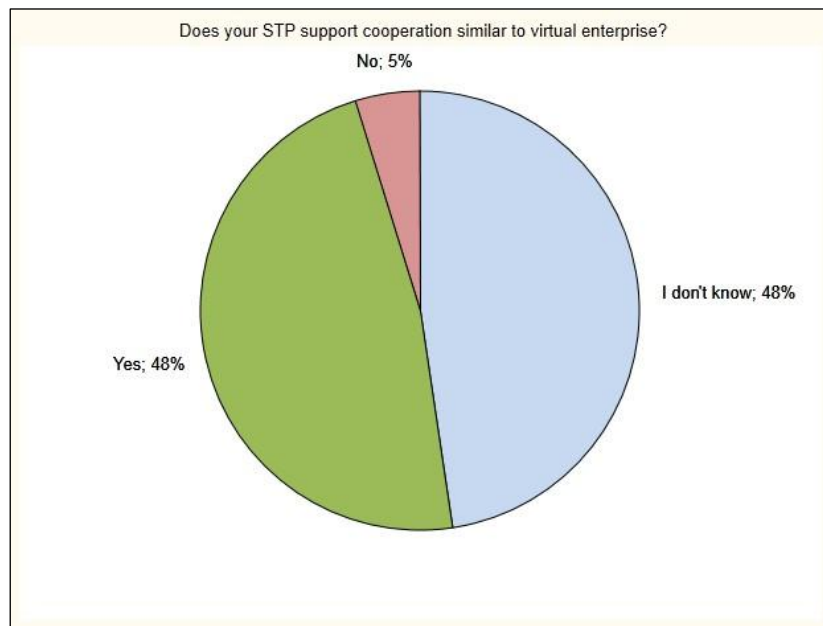
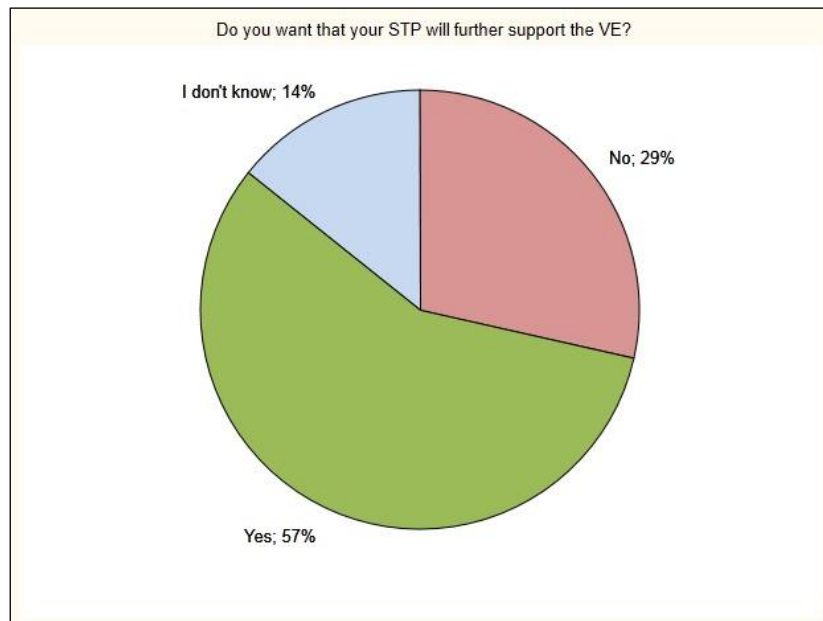


Figure 10 shows whether tenants want to get further support of VE in their STP. Most of the respondents answered yes (57%), minority (14%) answered that they don't know and 29% answered no.

Figure 10: The further support of VE in STPs



The next part of the research was made by semi-structured interview with the managing director of Technological Centre of Hradec Kralove (www.tchk.cz). The information acquired was how the support of virtual enterprise is managed and if the tenants are establishing the VE.

The result was that Technological Centre of Hradec Kralove does not actively support the VE, but they think that it is an interesting way how to reach a business opportunity. However there was recognized one case of VE formation between two tenants. Incubated firm focusing on web coding made a VE with another incubated web design firm and together they got the contract. Without the VE they would not meet the criteria of the contract because of the lack of capabilities. There was no case of VE established by tenant and external company.

In summary, according to the interview:

- 1) Virtual enterprise is not supported implicitly in the TCHK.
- 2) Tenants are willing to establish VEs.
- 3) The formation of VEs is out of control of STP.
- 4) External companies are not willing to establish VE with tenants.

Conclusion and recommendations

The virtual enterprise is new and dynamic way for enhancing the competitiveness of the company. It can be defined as “a temporary network of independent companies, suppliers, customers - even rivals, linked by information technology to share costs, skills and access one another’s markets “. Large companies can (according to their financial and experience background) establish the VE easily. However start-ups or small and medium enterprises suffers under the lack of skills, finance and time to deal with the VE formation.

At this stage the science and technology park can play the main role. In the life-cycle of virtual enterprise the STP should focus on the initial phase of VE creation (dynamic phase). STPs should offer sufficient information, skills and contacts for the most difficult part of the virtual enterprise’s lifecycle = the partner identification.

The situation in the Czech Republic can be described as steady growth. However there are huge differences in the regions. The highly economically strong regions have a large number of STPs and many regions have only one or none STP.

The tenants who responded in the survey answered that mostly they have experience with similar cooperation such as virtual enterprises. Moreover the majority of respondent is interested in having a possibility of getting information and support in terms of virtual enterprises from science and technology parks. Therefore the VE is not seen as something hostile and under proper supervision can represent valued tool for tenants.

According to the interview with the managing director of Technological Centre of Hradec Kralove (TCHK), there is a lack of support from TCHK. However without any intervention there was at least one VE established between tenants at the TCHK. On the other hand the cooperation with external companies is not common at the moment.

The recommendations for the science and technology parks:

- a) The VE is a new dynamic tool how to increase tenant’s competitiveness.
- b) STPs’ role is in the dynamic phase of VE’s lifecycle.
- c) Tenants are not reluctant to establish VEs.
- d) The VE formation could fill the lack of tenant’s capability.
- e) The VE between tenants is a possibility how to reach new market opportunities.

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